Fort River Elementary School

Feasibility Study – Community Presentation

February 13th, 2019

TSKP STUDIO ARCHITECTURE | PLANNING | INTERIORS

Fort River School| Community Involvement

Presentation Goals:

1. Introduction to TSKP STUDIO
2. Update on Feasibility Study
3. Review the Options
4. Discuss Cost Factors
5. Request Feedback

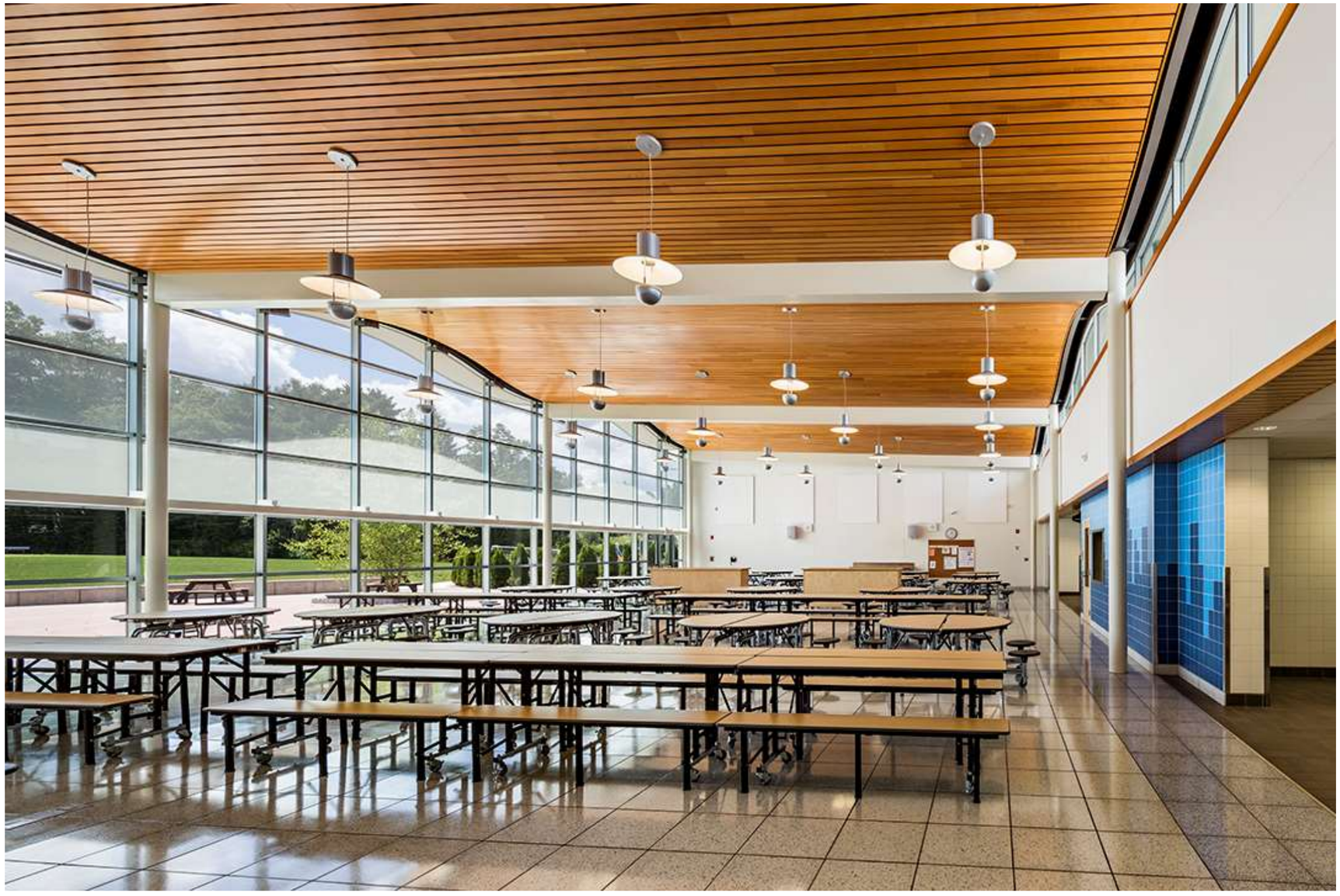
Design Quality | Simple… Child Friendly

Design Quality | Age Appropriate Scale

Design Quality | Natural Light… Welcoming

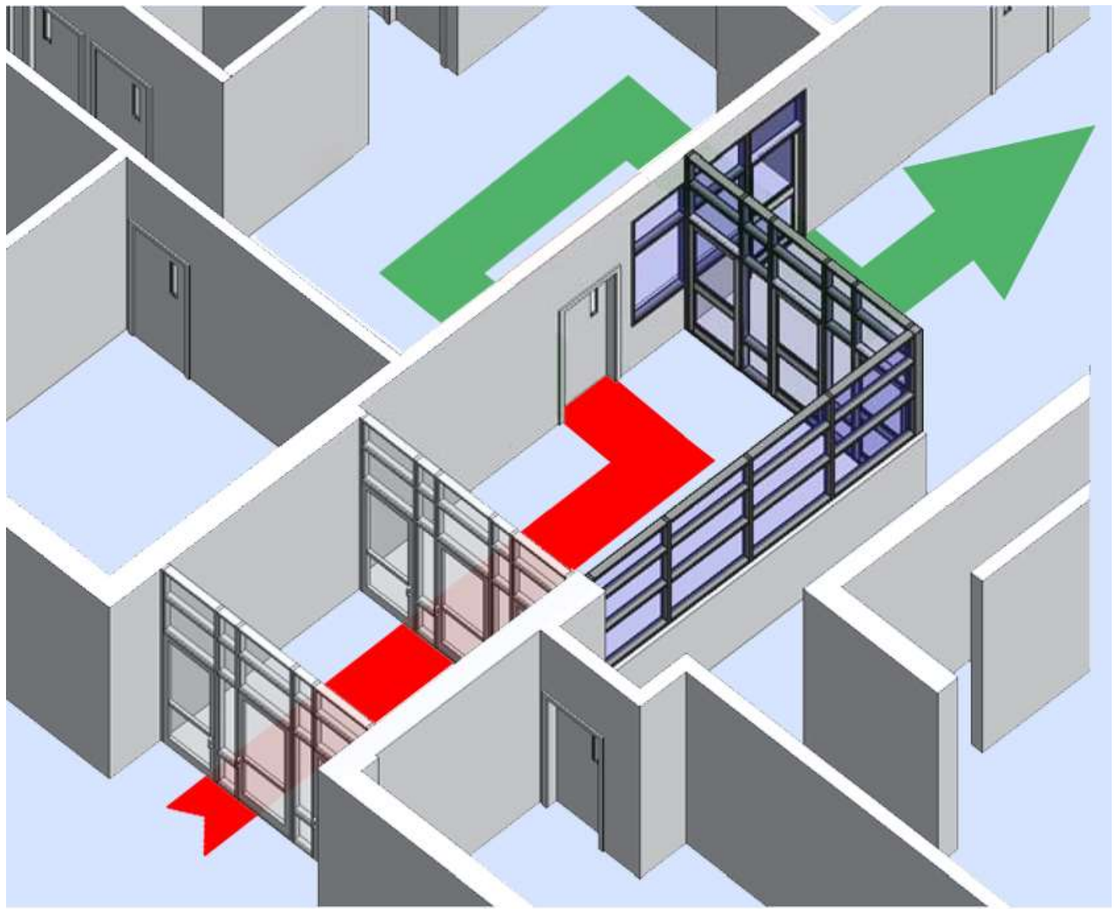
Design Quality | Multi-functioning Space

Design Quality | Beautiful and Durable



Design Quality | Connections to the Outdoors

Design Quality | Security + Safety

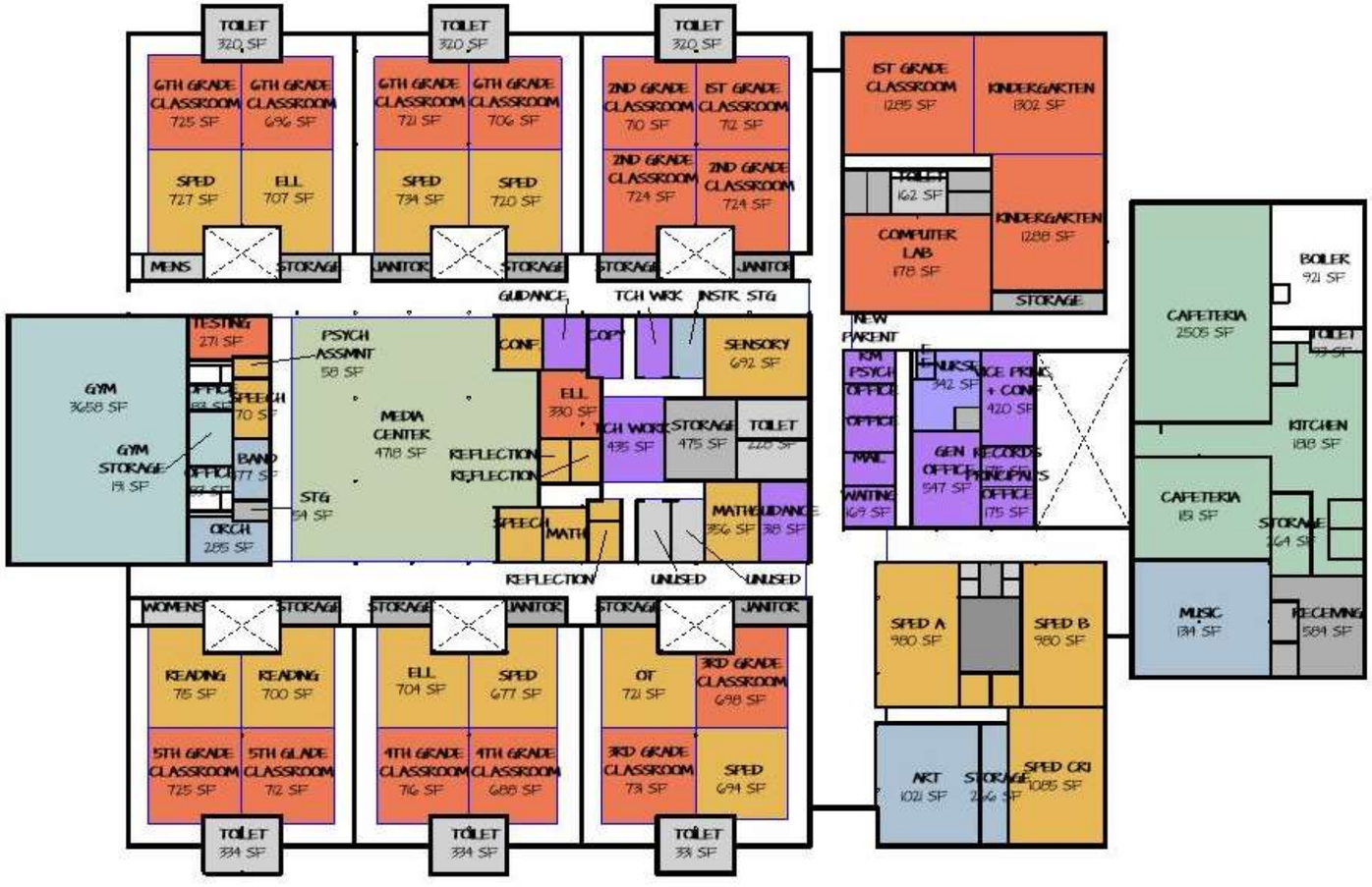


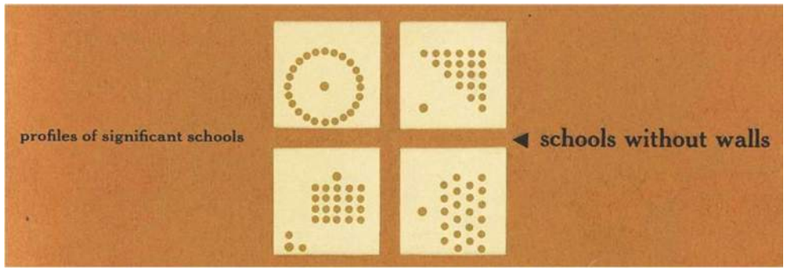
Existing Conditions Investigations

Existing Conditions| Summary

1. Deferred Capital Infrastructure Replacement Items
   - ✓ Roof
   - ✓ HVAC system
   - ✓ Electrical system
   - ✓ Window Replacement
2. Unsatisfied Educational Needs
   - ✓ Open Classrooms
   - ✓ Accessibility
   - ✓ Lighting
   - ✓ Communication Systems
   - ✓ Technology Infrastructure
   - ✓ Interior Environment
3. Security
   - ✓ Access Control
   - ✓ Passive Surveillance, Building Exterior hardening, Classroom Security

Existing Conditions| Summary





Educational Facilities Laboratories c. 1958, - "Schools Without Walls"

Existing Conditions| Open Classrooms

Existing Conditions| Daylighting

Educational Space Needs

Educational Space Needs| Right Size

	Fort River Study Range				MSBA guidelines
K-6 Enrollment	315 ◄			► 420	420
Pre-K Enrollment (FTE)	0	45	0	45	45
Total Enrollment	315	360	420	465	465
Total Building Gross Floor Area	70,000	77,000	78,000	84,000	72,742

Compared to MSBA guidelines:

Amherst Classroom Guidelines		4,725
District SE (AIMS, Bldg. Blocks)		5,917
Pre-K Administration and Support		1,743
MSBA guideline (adjusted)		85,127

Educational Space Needs| Fort River Rooms + Educational Program

Table of Contents

CORE ACADEMIC SPACES	
Pre-Kindergarten w/ toilet	3
Kindergarten w/ toilet	3
General Classrooms - Grade 1-6	18
Computer Lab / Maker Space	1
Break out Teaching Space (1 per grade 1-6)	6

SPECIAL EDUCATION	
Large group SE	1
Small group SE	2
Self-Contained SPED - toilet	3
AIMS Program	1
AIMS Program - Reflection Room	1
Building Blocks Program	2
Building Blocks Program - Reflection Room	2
ELL classrooms	2
Speech	2
Math	1
Assessment Room	1
Sensory	1
Office for ETL	1
Reflection Room	2
Reading	2
Occupational Therapy / Physical Therapy	1
Speech for PK	1
OT/PT for PK	1
Behavior Analyst for PK	1

ART & MUSIC	
Art Classroom - 25 seats	1
Art Workroom w/ Storage & kiln	1
Music Classroom / Large Group - 25-50 seats	1
Instrumental Music (6-8 students)	2

HEALTH & PHYSICAL EDUCATION	
Gymnasium	1
Gym Storeroom	1
Health Instructor's Office w/ Shower & Toilet	1

MEDIA CENTER	
Media Center / Reading Room	1

DINING & FOOD SERVICE	
Cafeteria / Dining	1
Stage	1
Chair / Table / Equipment Storage	1
Kitchen	1
Staff Lunch Room	1

MEDICAL	
Medical Suite Toilet	1
Nurses' Office / Waiting Room	1
Examination Room / Resting	2

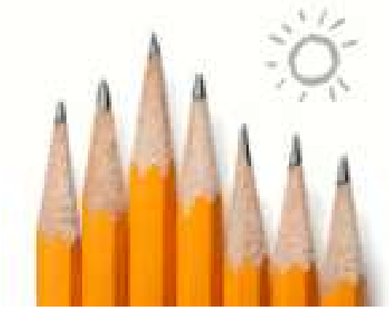
ADMINISTRATION & GUIDANCE	
General Office / Waiting Room / Toilet	1
Teachers' Mail and Time Room	1
Duplicating Room	1
Records Room	1
Principal's Office w/ Conference Area	1
Principal's Secretary / Waiting	1
Assistant Principal's Office	1
Supervisory / Spare Office	1
Conference Room	1
Guidance Office	2
Guidance Office	1
Guidance Storeroom	1
Teachers' Work Room	2
Psychologist's Office	1
Parent Room	1
PK Coordinator w/Conf	1

CUSTODIAL & MAINTENANCE	
Custodian's Office	1
Custodian's Workshop	1
Custodian's Storage	1
Recycling Room / Trash	1
Receiving and General Supply	1
Storeroom	1
Network / Telecom Room	1

Sustainability and Net Zero

What makes it sustainable?

- Safe and Healthy
- Resource Efficient
- Flexible and Adaptable
- Durable and Maintainable



Massachusetts School Building Authority

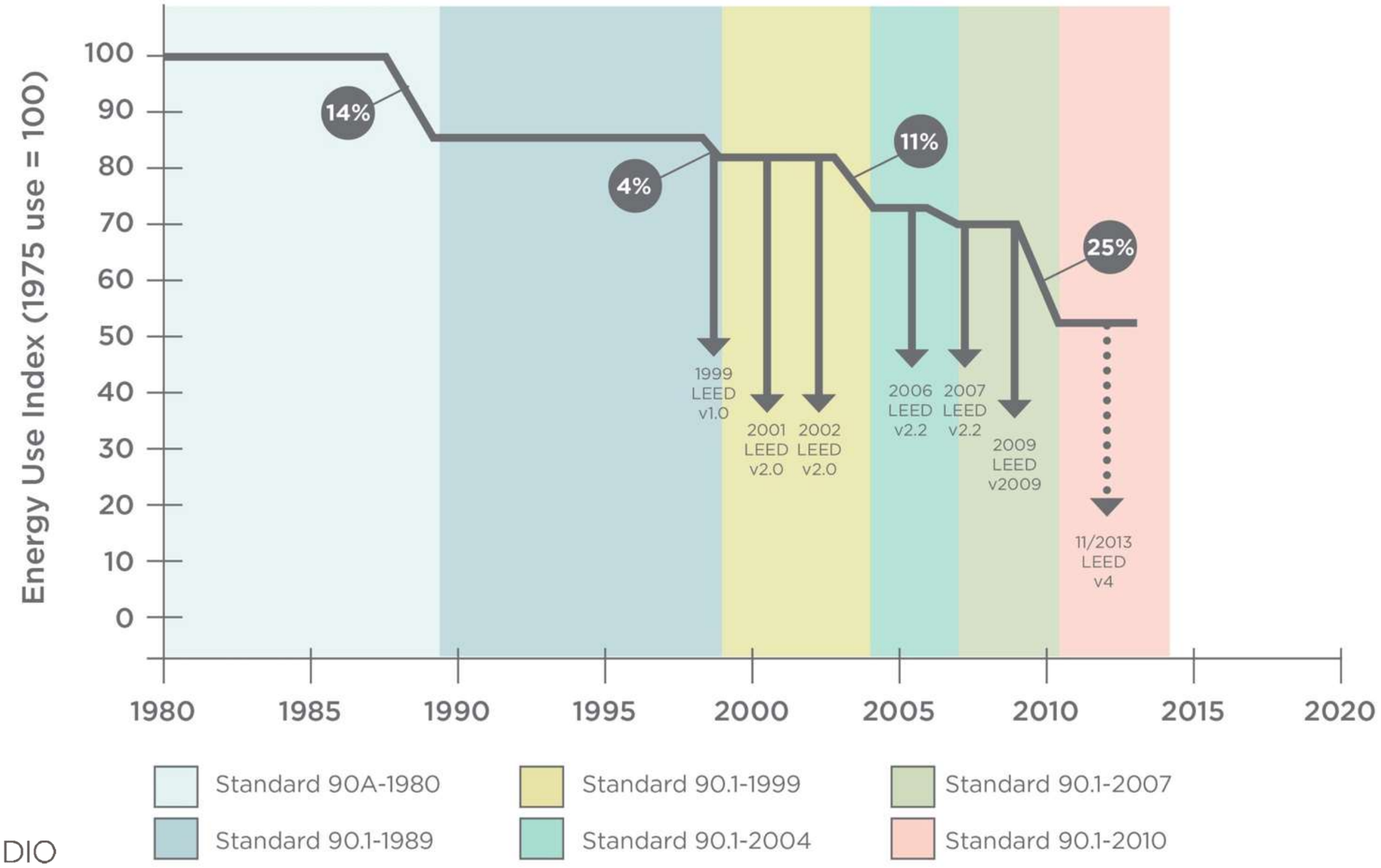
Funding Affordable, Sustainable, and Efficient Schools in Partnership with Local Communities

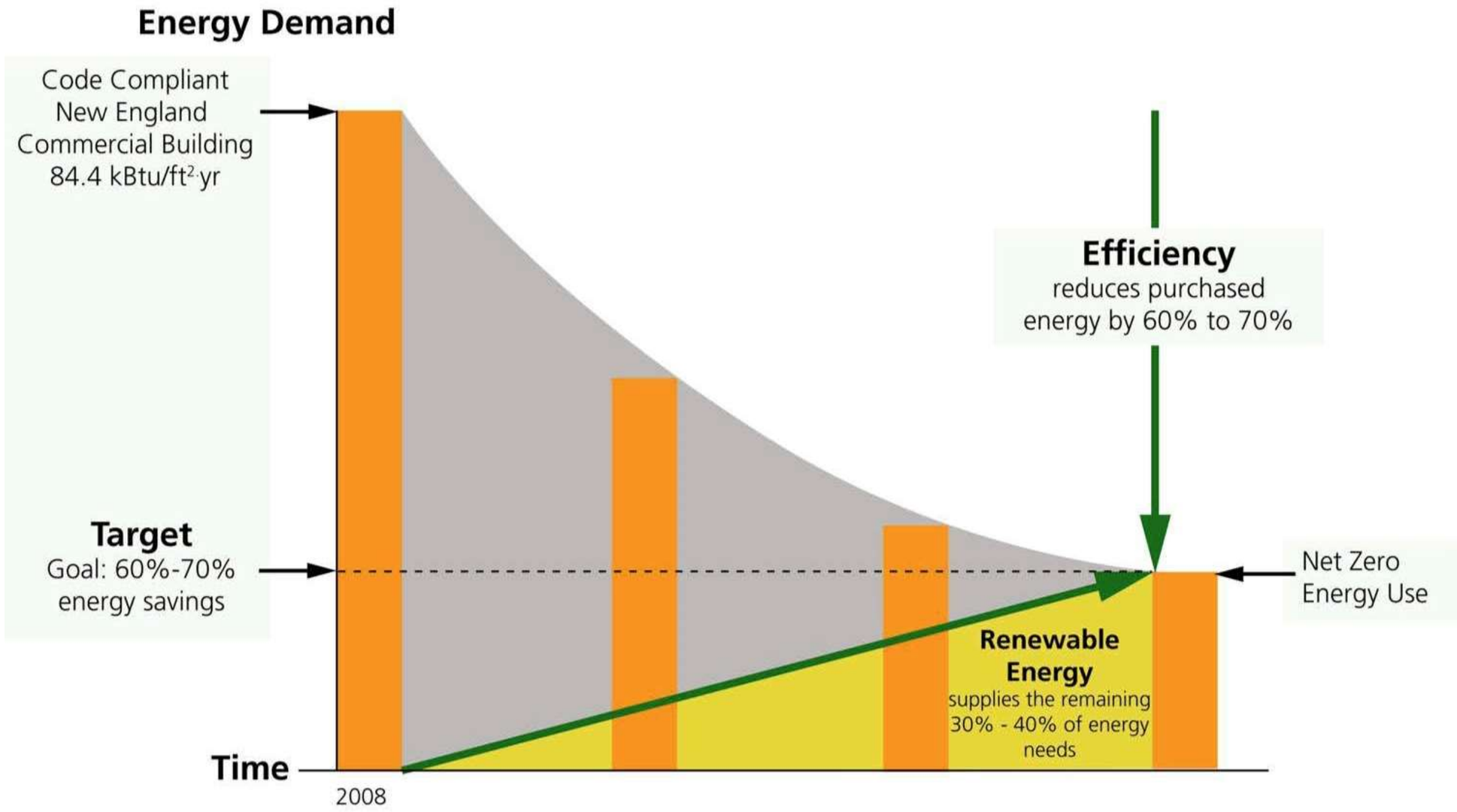
Minimum Requirements for funding:

1) LEED v4 Certified, or NE-CHPS Verified
2) 10% better than energy code

2% additional reimbursement for projects that can exceed energy code by at least 20%

Energy Codes and LEED Requirements





Source: Federal R&D Agenda for Zero-Net Energy high Performance Green Buildings, National Science and Technology Council, October 2008

Design Options

Design Options| Range of Options

NEW BUILDING

2 STORY ADDITION

1 STORY ADDITION

TWO SMALL ADDITIONS

SMALL ADDITION

BASE REPAIR

A

B

C

D

E

F

100% NEW

50% NEW

29% NEW

18% NEW

7% NEW

0% NEW

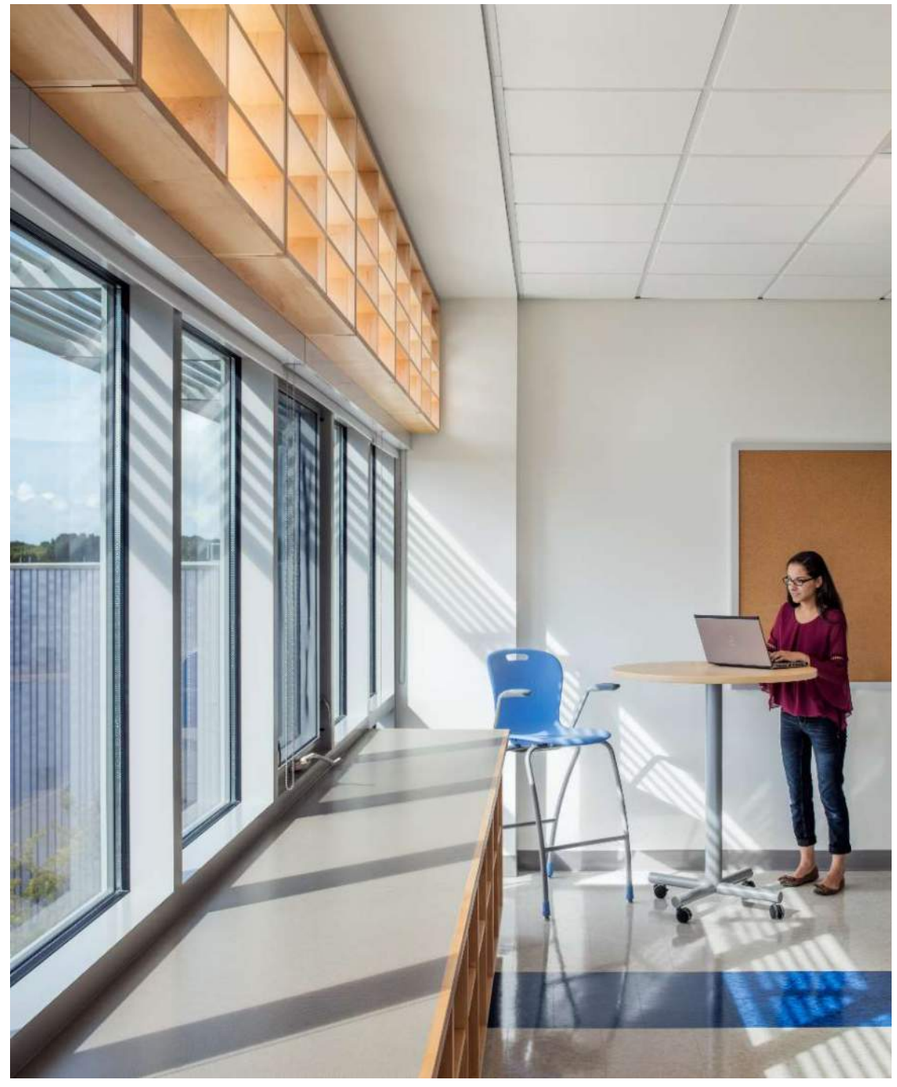
Simplest construction phasing

Complicated construction phasing

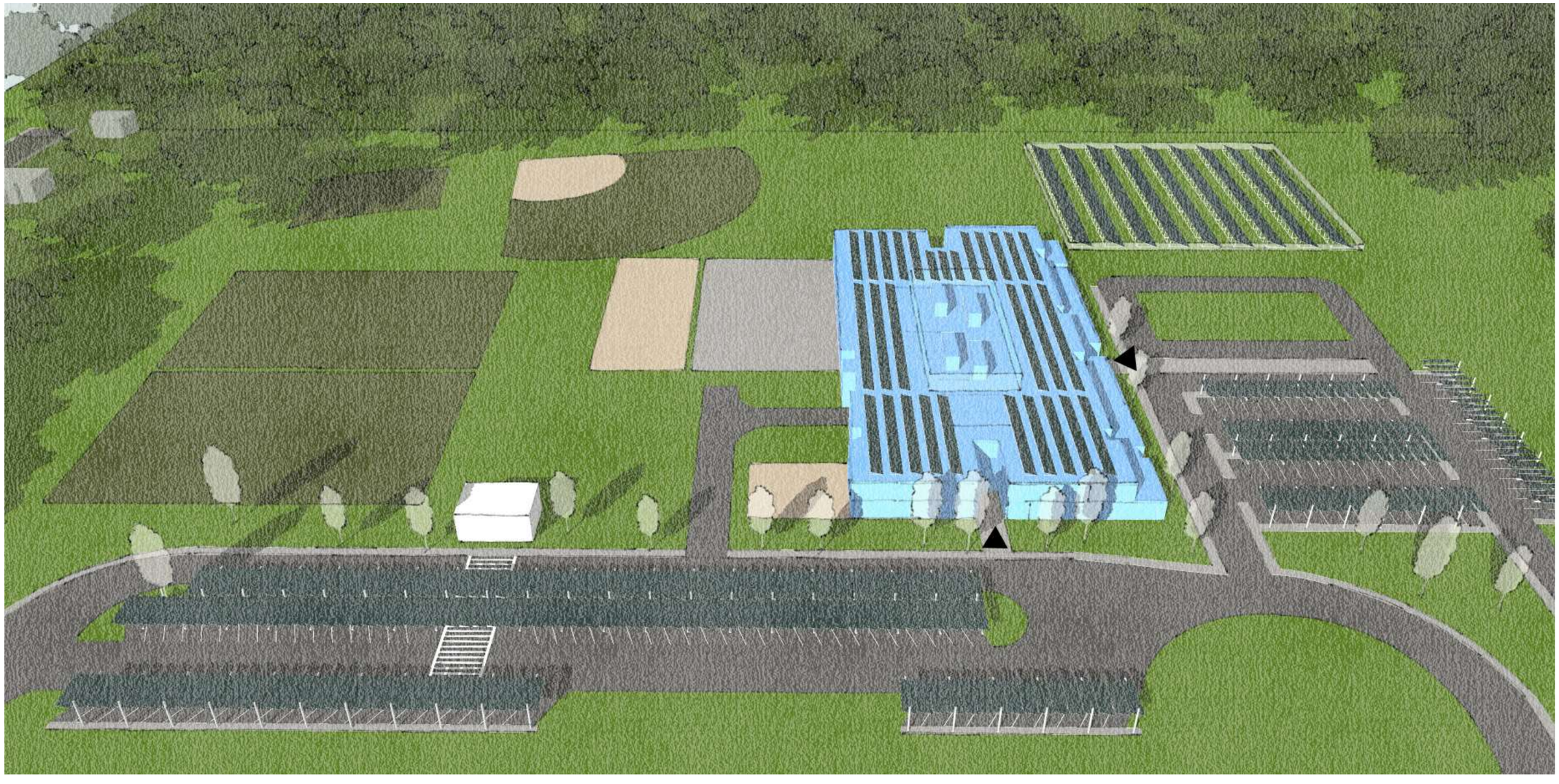
Design Options| Non-Negotiables

Included in Options A – E:

- ✓ Natural Light in all Classrooms
- ✓ Good air quality / ventilation / circulation
- ✓ Good Acoustics (ANSI S12.60)
- ✓ Elimination of open classroom design
- ✓ Compliance with Town’s Net Zero bylaw
- ✓ Sustainable design
- ✓ Flexibility in case of increased enrollment in the future
- ✓ Adequate space for program needs
- ✓ Cost and Environmental analysis that includes construction, demolition, swing space, operations
- ✓ Accessible
- ✓ Building and Energy code compliance



100% NEW



AMHERST FORT RIVER SCHOOL AERIAL VIEW OPTION A

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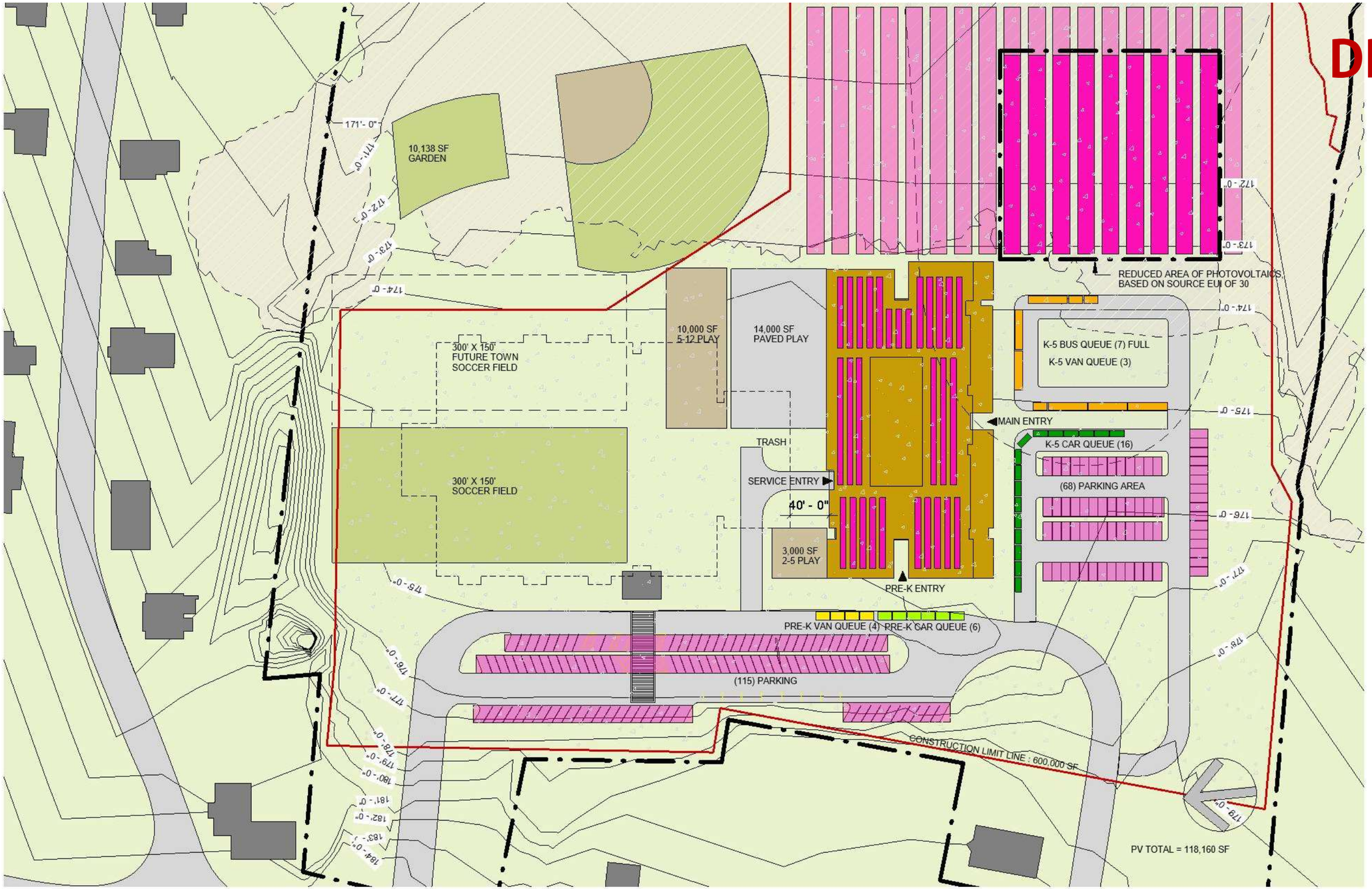
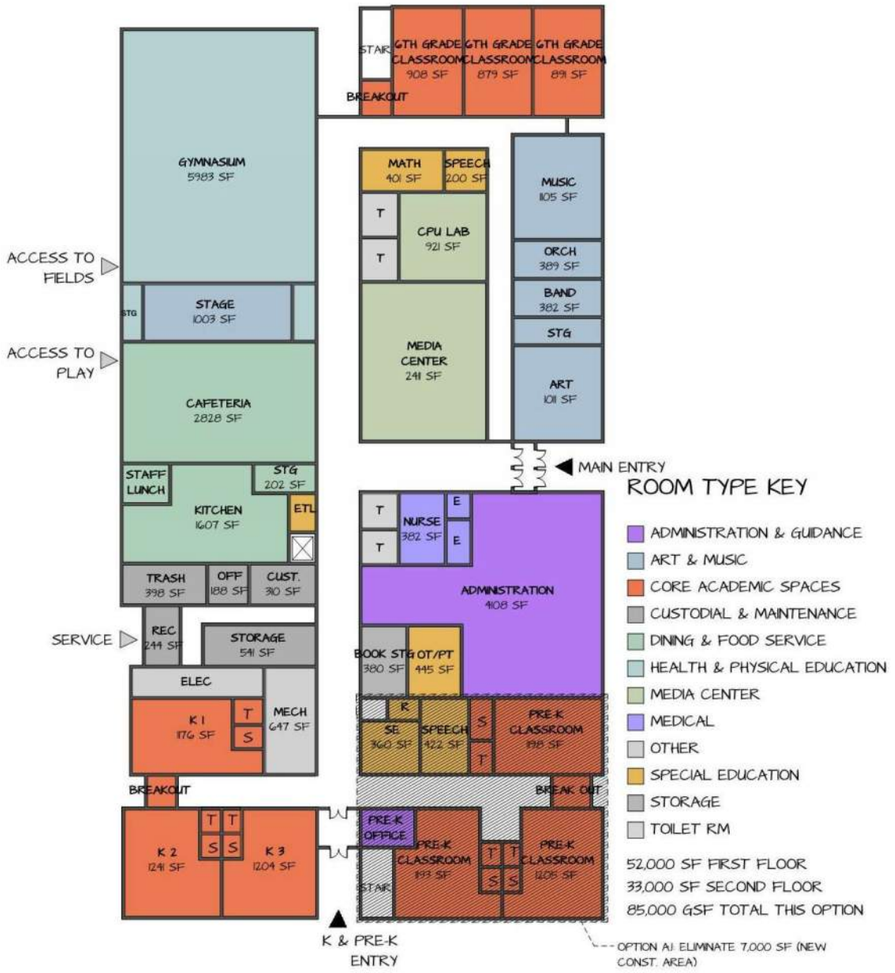


AMHERST, FORT RIVER SCHOOL SITE PLAN OPTION A

TSKP STUDIO

03/29/18



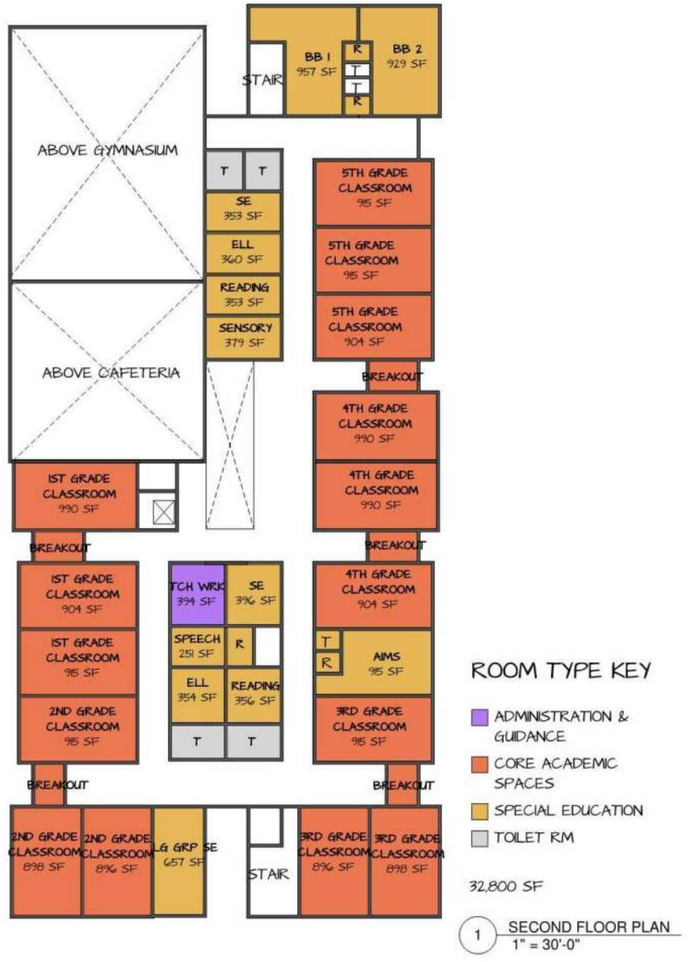
1 FIRST FLOOR PLAN
1" = 30'-0"

AMHERST, FORT RIVER SCHOOL

OPTION A, A.1

TSKP STUDIO

06/15/18



1 SECOND FLOOR PLAN
1" = 30'-0"

AMHERST, FORT RIVER SCHOOL

OPTION A, A.1

50% NEW

AMHERST FORT RIVER SCHOOL AERIAL VIEW OPTION B

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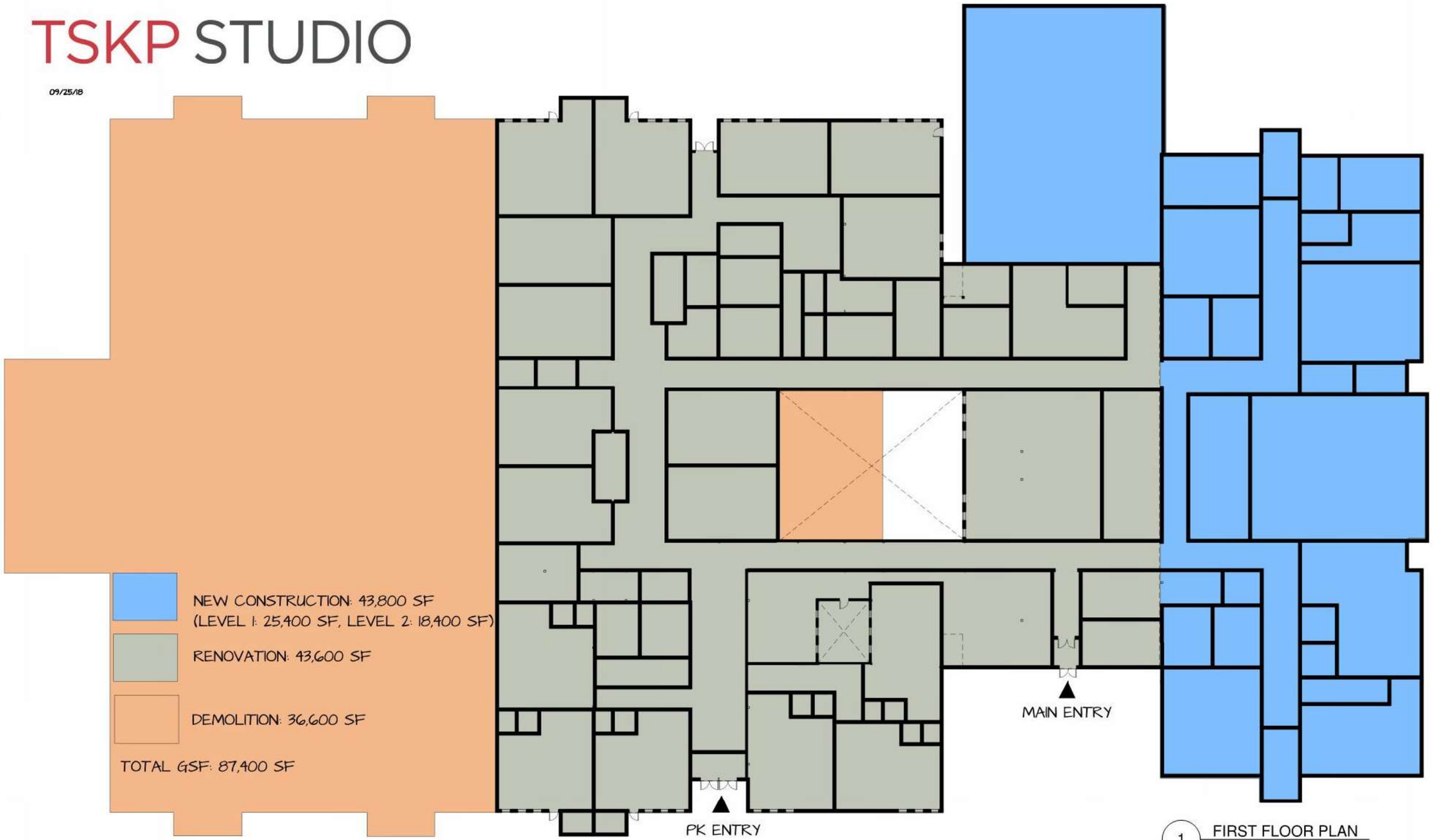
AMHERST, FORT RIVER SCHOOL SITE PLAN OPTION B

TSKP STUDIO

09/25/18



1 FIRST FLOOR PLAN
1" = 30'-0"

AMHERST, FORT RIVER SCHOOL NEW, RENO, DEMO, OPTION B

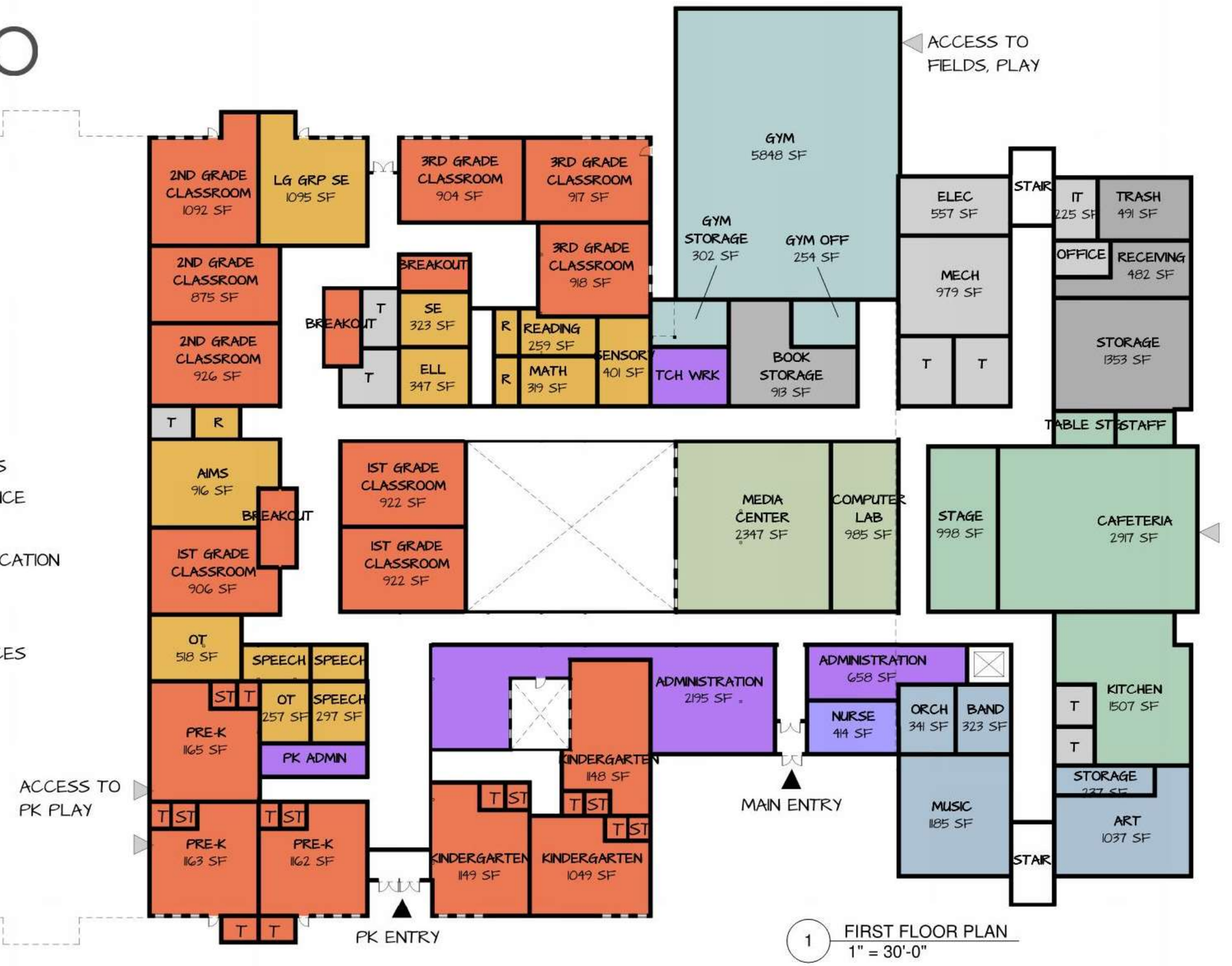
TSKP STUDIO

10/22/18

ROOM TYPE KEY

- ADMINISTRATION
- ART & MUSIC
- CORE ACADEMIC SPACES
- CUSTODIAL & MAINTENANCE
- DINING & FOOD SERVICE
- HEALTH & PHYSICAL EDUCATION
- MEDIA CENTER
- MEDICAL
- NON-PROGRAMMED SPACES
- OTHER
- SPECIAL EDUCATION
- STORAGE
- TOILET ROOMS

LEVEL 2: 18,400 SF
LEVEL 1: 69,000 SF
TOTAL: 87,400 SF



1 FIRST FLOOR PLAN
1" = 30'-0"

AMHERST, FORT RIVER SCHOOL

OPTION B, B.1

TSKP STUDIO

09/25/18

1 SECOND FLOOR PLAN
1" = 30'-0"

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OPTION B, B.I

29% NEW

AMHERST FORT RIVER SCHOOL AERIAL VIEW OPTION C

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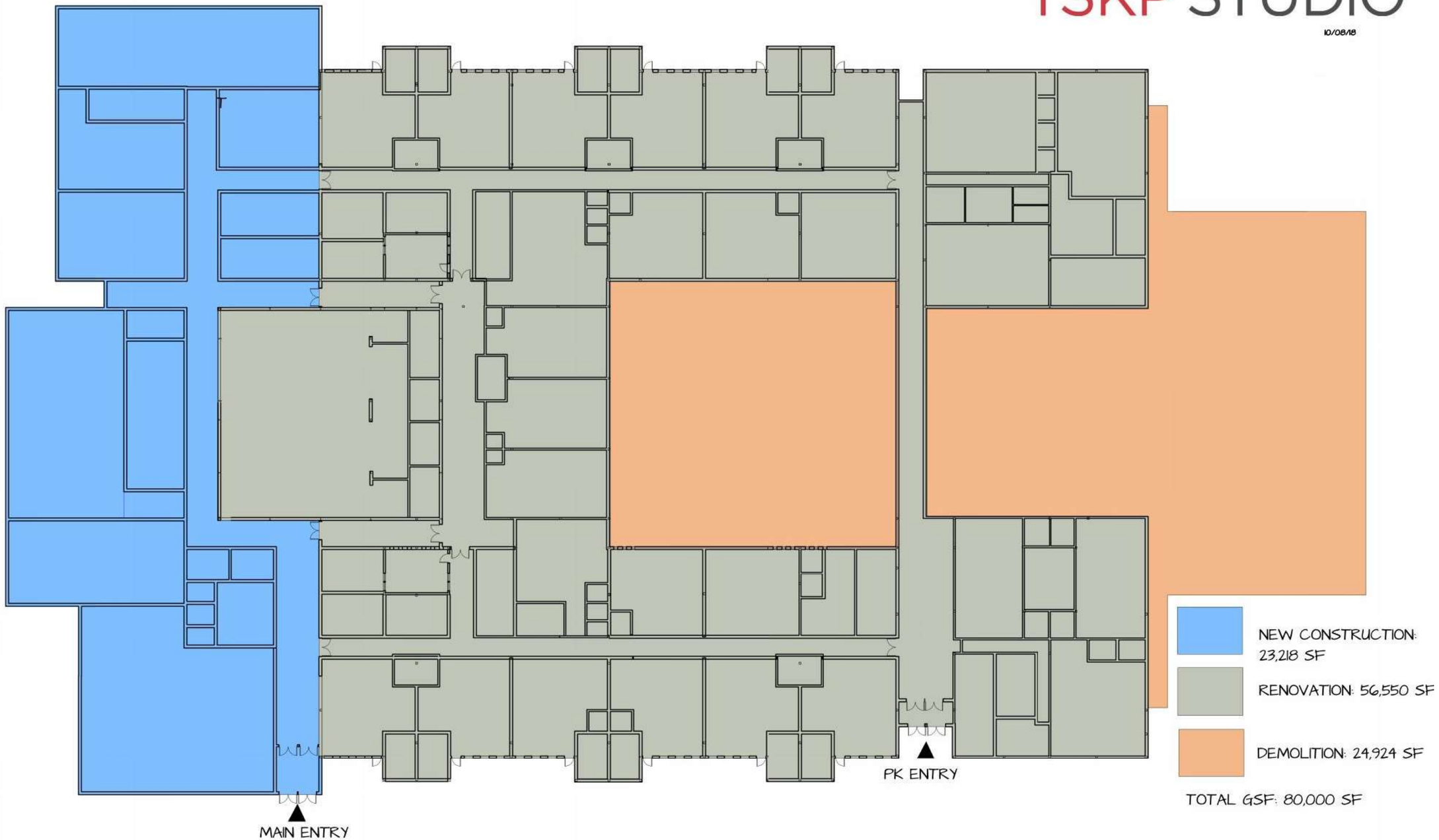
AMHERST, FORT RIVER SCHOOL SITE PLAN OPTION C

TSKP STUDIO

10/08/18



AMHERST, FORT RIVER SCHOOL NEW, RENO, DEMO, OPTION C

TSKP STUDIO

10/22/18

AMHERST, FORT RIVER SCHOOL

OPTION C, C.I

18% NEW

AMHERST FORT RIVER SCHOOL AERIAL VIEW OPTION D

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AMHERST, FORT RIVER SCHOOL SITE PLAN OPTION D

TSKP STUDIO

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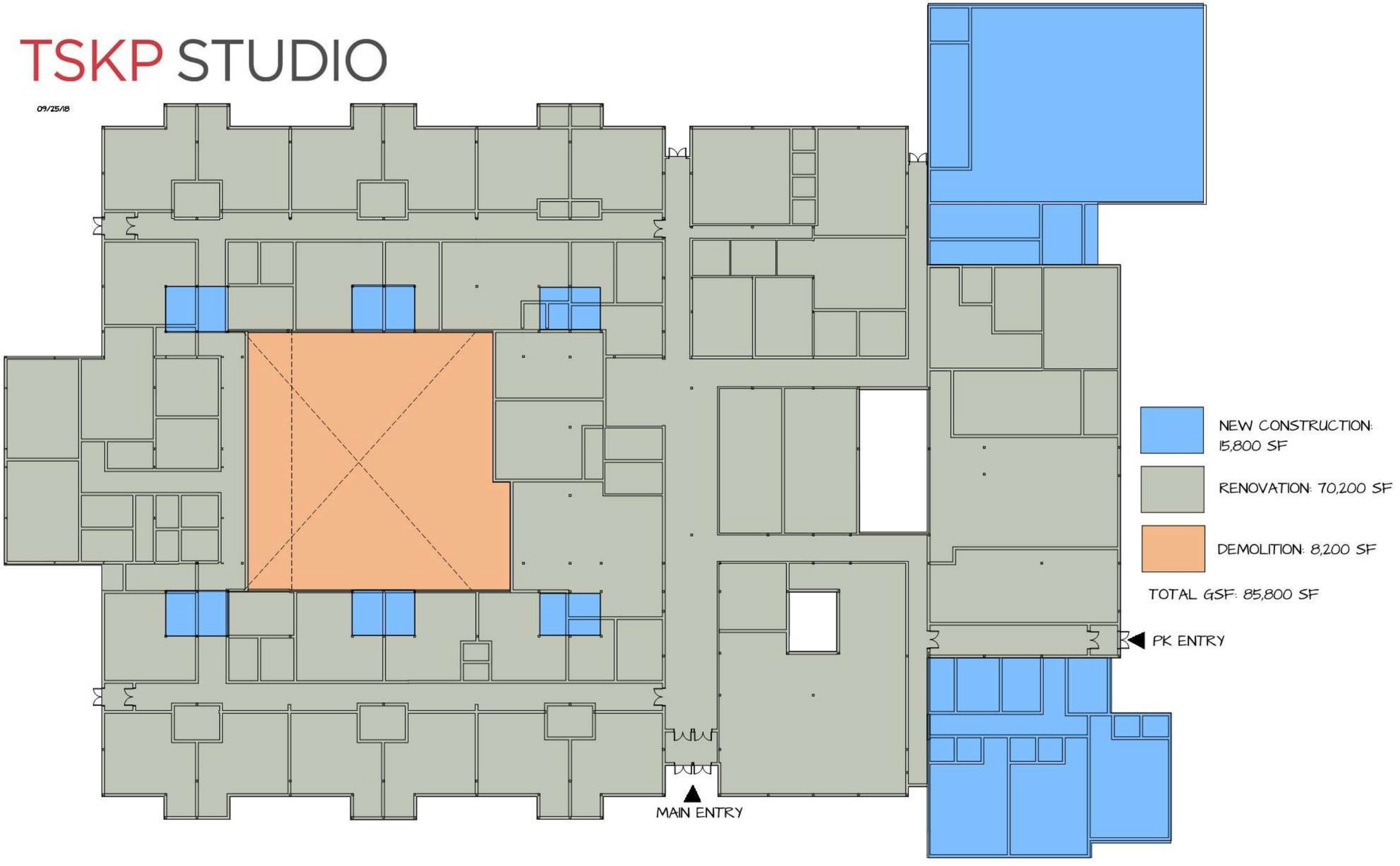

AMHERST, FORT RIVER SCHOOL NEW, RENO, DEMO, OPTION D

TSKP STUDIO

10/22/18

ROOM TYPE KEY

- ADMINISTRATION
- ART & MUSIC
- CIRCULATION
- CORE ACADEMIC SPACES
- CUSTODIAL & MAINTENANCE
- DINING & FOOD SERVICE
- HEALTH & PHYSICAL EDUCATION
- MEDIA CENTER
- MEDICAL
- OTHER
- SPECIAL EDUCATION
- TOILET ROOMS

TOTAL GSF: 85,755 SF

PK ENTRY

AMHERST, FORT RIVER SCHOOL

OPTION D, D.1

7% NEW

AMHERST FORT RIVER SCHOOL AERIAL VIEW OPTION E

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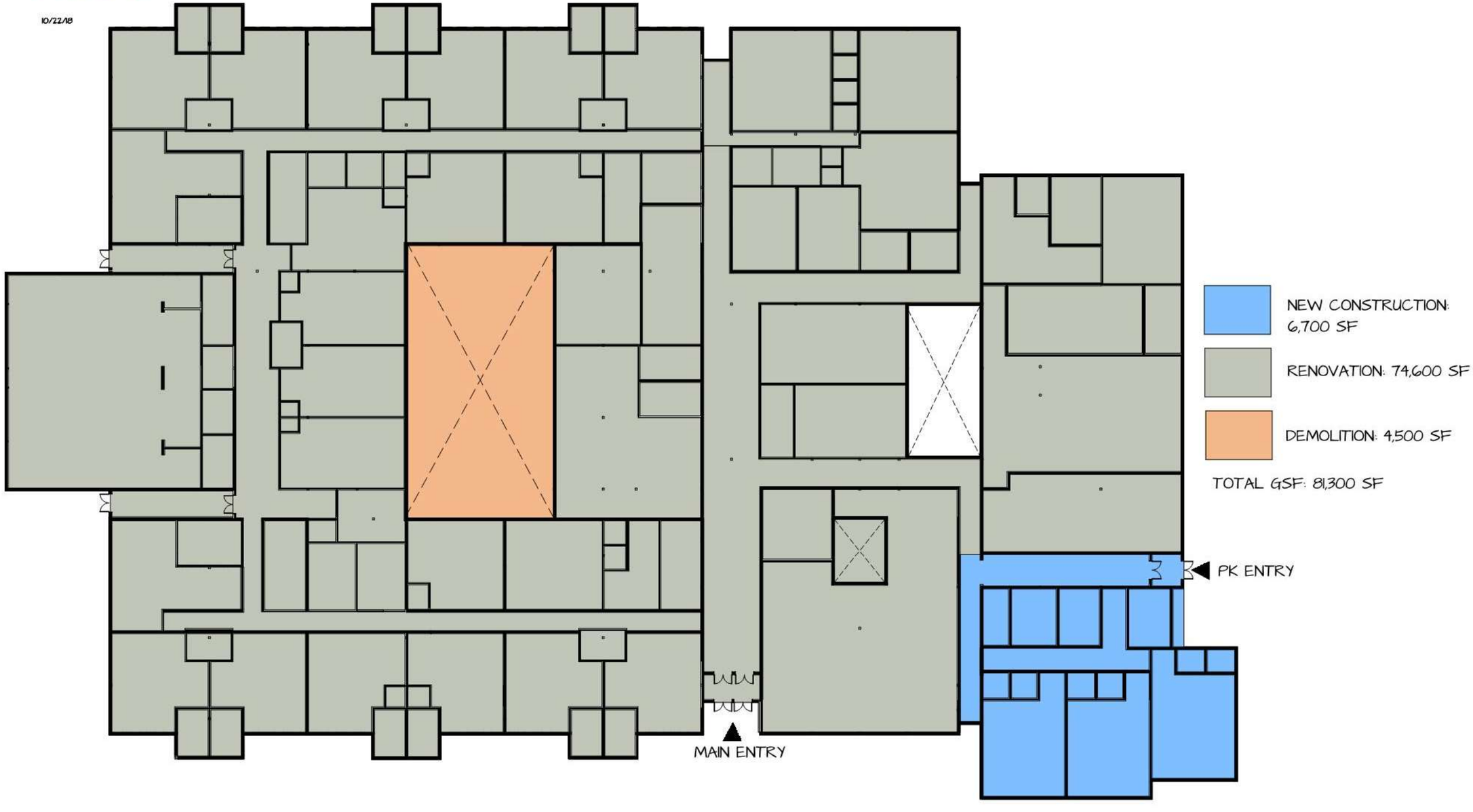
AMHERST, FORT RIVER SCHOOL SITE PLAN OPTION E

TSKP STUDIO

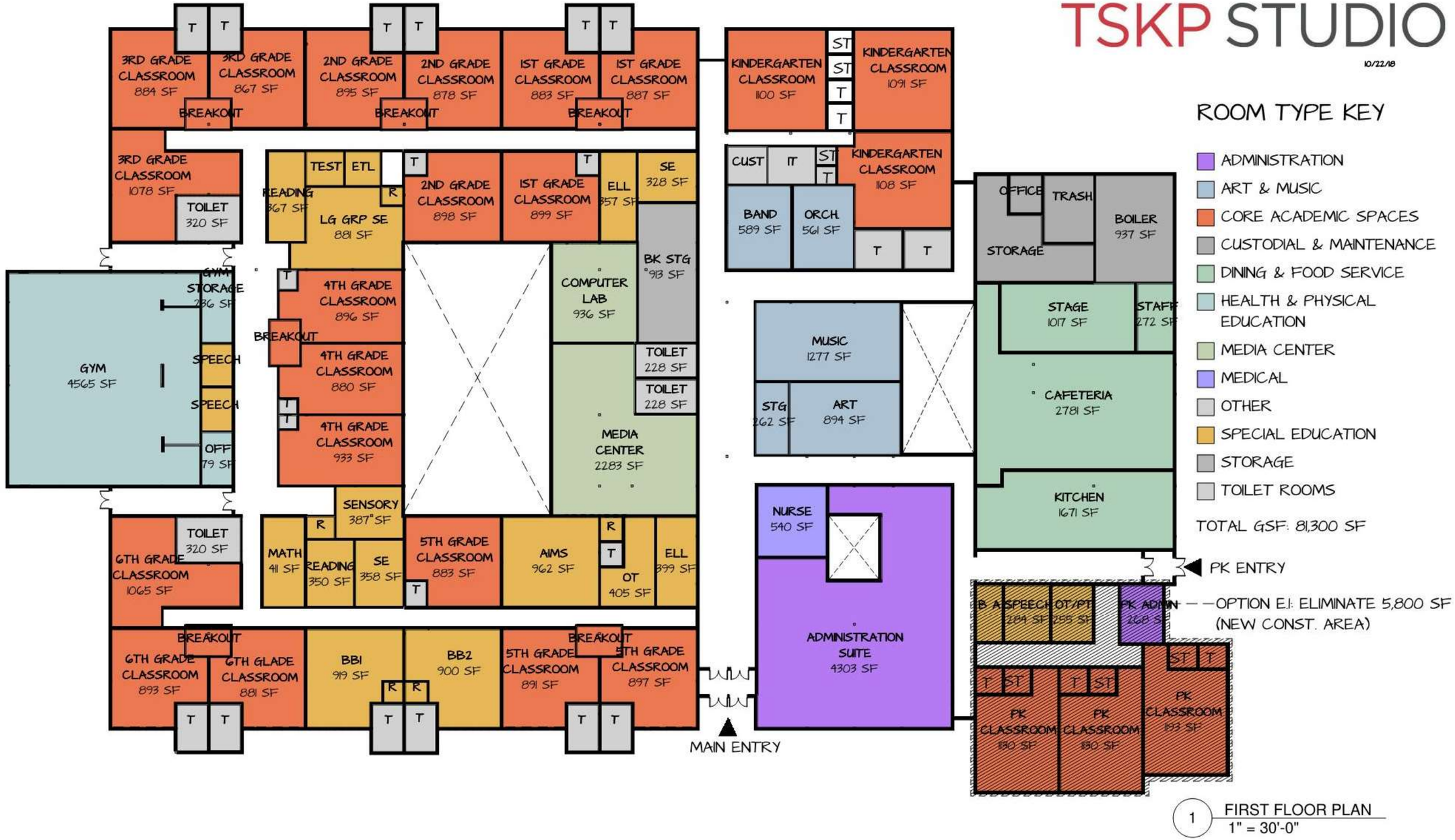
10/22/18



AMHERST, FORT RIVER SCHOOL NEW, RENO, DEMO, OPTION E

TSKP STUDIO

10/22/18



1 FIRST FLOOR PLAN
1" = 30'-0"

ROOM TYPE KEY

- ADMINISTRATION
- ART & MUSIC
- CORE ACADEMIC SPACES
- CUSTODIAL & MAINTENANCE
- DINING & FOOD SERVICE
- HEALTH & PHYSICAL EDUCATION
- MEDIA CENTER
- MEDICAL
- OTHER
- SPECIAL EDUCATION
- STORAGE
- TOILET ROOMS

TOTAL GSF: 81,300 SF

AMHERST, FORT RIVER SCHOOL

OPTION E, E.1

0% NEW

- Abatement
- Roof replaced
- Windows replaced
- Reconfigure restrooms, doors, walls, etc to be ADA accessible
- Replace mechanical systems. Keep existing boilers.
- Replace electrical, interior lighting, fire alarm.
- New Sprinkler System
- Ceilings and Floor finishes replaced.
- Re-paving existing asphalt areas and resetting granite curbing
- Replacing playground equipment and surfacing

AMHERST FORT RIVER SCHOOL AERIAL VIEW OPTION F

Discuss Cost Factors

Design Options| Cost Factor: Construction Phasing and Duration

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NEW BUILDING
85,000 SF

A

100%
NEW
Simple Phasing

22
months

2 STORY ADDITION
87,400 SF

B

50%
NEW

24
months

1 STORY ADDITION
79,768 SF

C

29%
NEW

28
months

TWO ADDITIONS
86,000 SF

D

18%
NEW

36
months

SMALL ADDITION
81,300 SF

E

7%
NEW
Complicated Phasing

36
months

BASE REPAIR
78,000 SF

F

0%
NEW

24
months

Fort River School| Cost Factor : Path to Net Zero

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New Construction:

Targeting EUI 50

- Full Kitchen.
- Summer Programs – full building year round use.
- Double glazed windows with Low-E coating.
- R25 Walls.
- R30 Roof.
- VAV with energy recovery.
- LED lighting.

Targeting EUI 30

- Full Kitchen
- Summer Program for part of the building only.
- Relaxed interior temperatures:
  - Summer 77 to 78 degrees with lower humidity
  - Winter – 68 degrees.
- Triple Glazing
- R35 Walls
- R60 Roof
- R15 under slab
- Geothermal with Chilled Beam (or Geothermal with VRF)
  - Operational considerations for more complicated systems
- Radiant flooring on the ground floor

Renovation:

Targeting EUI 50

- Full Kitchen.
- Summer Programs – full building year round use.
- New roof insulation R30
- New windows, double glazed with low E coating
- Use existing boilers (or go all electric with small geothermal heat pump?)
- VAV with energy recovery
- LED lighting.

Targeting EUI 30

- Full Kitchen
- Summer Program for part of the building only.
- Relaxed interior temperatures:
  - Summer 77 to 78 degrees with lower humidity;
  - Winter – 68 degrees.
- Roof Insulation R60
- Wall Insulation R35
- New Windows, triple glazing
- Geothermal with Chilled Beam (or Geothermal with VRF)
- Roof-top heat pumps (with electric backup)
- Geothermal with chilled beam (or Geothermal with VRF)
  - Operational considerations for more complicated systems

Fort River School| Cost Factor: Path to Net Zero

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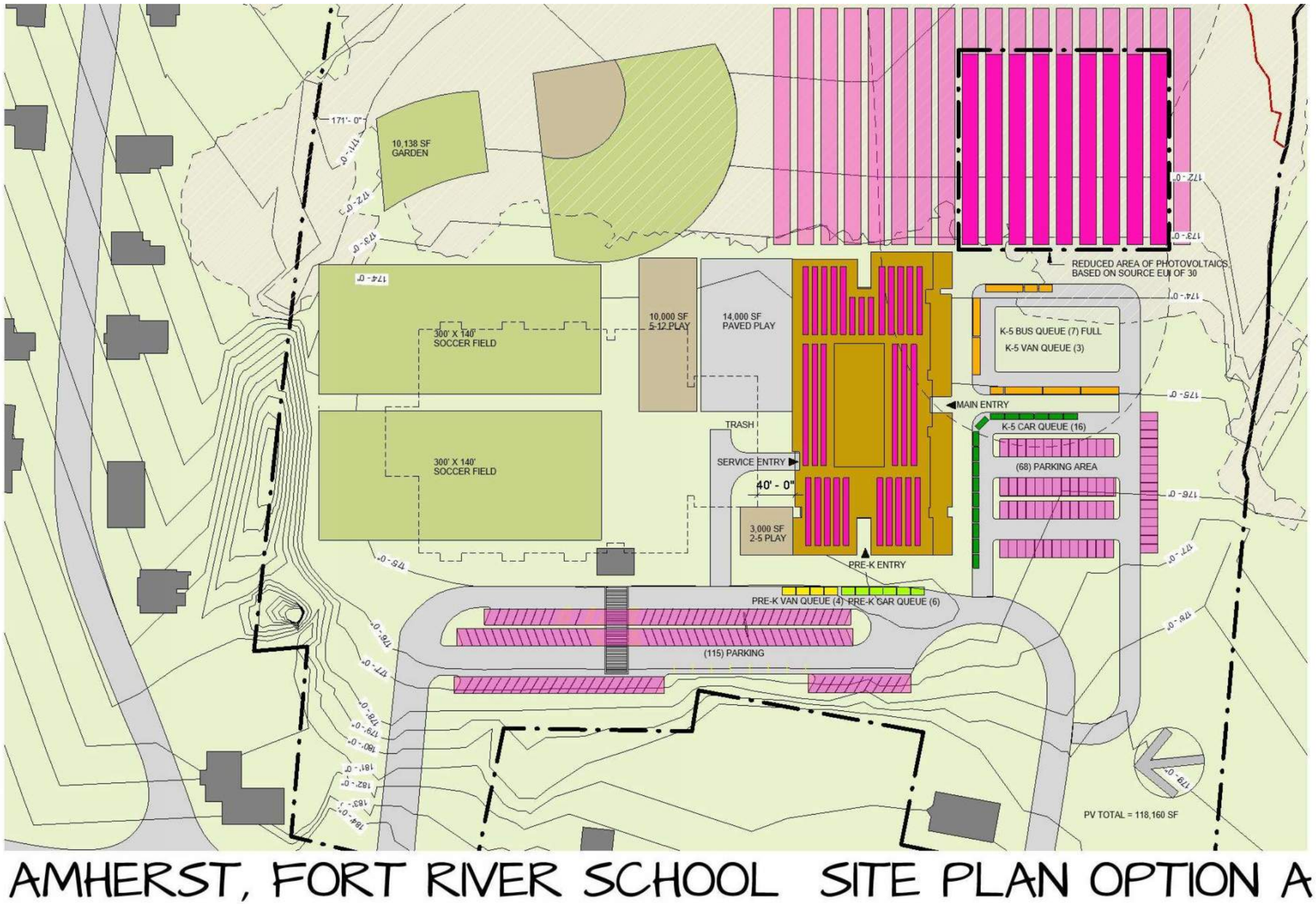

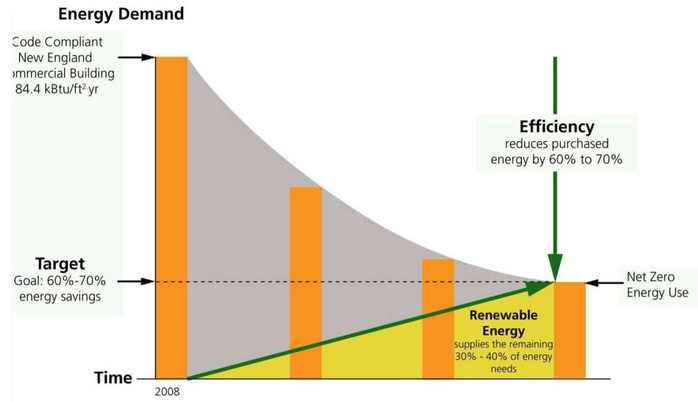

Source: Federal R&D Agenda for Zero-Net Energy high Performance Green Buildings, National Science and Technology Council, October 2008

If we target an Energy Use Intensity of 50 …
the area of PV that is required is *ALL* of the pink shown in the site plan.

PV panel cost :	$442,000 (project)*
Net Zero Premium:	$442,000 (project)

If we target an Energy Use Intensity of 30 …
the area of PV that is required is reduced as noted in the site plan. *However, there is a cost increase building envelope and systems*.

PV panel cost :	$265,000 (project)*
Increase for HVAC Option #4:	$2,380,000 (project)
Increase for Envelope:	$2,530,000 (project)
Net Zero Premium:	$5,175,000 (project)

* PV panels could be procured via a Power Purchase Agreement eliminating their cost to the project.

Fort River School| Cost Factor : Mechanical System

System Description	Plant	Initial Cost	Operational Cost	Maintenance	Equipment Filters in Zone
Option #1 – Air Cooled VRF	Air-Cooled (Electric)	**2**	**5**	**2**	Yes
Option #2 – Water Cooled VRF	Geothermal	**5**	**3**	**4**	Yes
Option #3 – Water Cooled VRF	Cooling Tower & Boiler	**3**	**4**	**6**	Yes
Option #4 – Water Cooled GSHP & Chilled Beams	Geothermal	**6**	**1**	**3**	No
Option #5 - Water Cooled HP & Chilled Beams	Cooling Tower & Boiler	**4**	**2**	**5**	No
Option #6 – VAV, DX RTU's	Air-Cooled (Electric)	**1+**	**6**	**1**	No

1 = Lowest
6 = Highest

Fort River School| Cost Factor: Procurement Method

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"Construction Cost Consultants"

Fort River Elementary School
Amherst, MA

November 30, 2018

GRAND SUMMARY

DESIGN OPTIONS:	CHPT 149 A CM @ Risk	CHPT 149 DESIGN/BID
OPTION A TOTAL	$46,951,674	$42,256,507
OPTION A1 TOTAL	$44,187,731	$39,768,958
OPTION A2 TOTAL	$43,792,882	$39,413,594
OPTION A3 TOTAL	$41,028,938	$36,926,045
OPTION B TOTAL	$43,194,409	$38,874,968
OPTION B1 TOTAL	$41,574,364	$37,416,928
OPTION B2 TOTAL	$40,920,662	$36,828,595
OPTION B3 TOTAL	$39,300,616	$35,370,555
OPTION C TOTAL	$39,282,624	$35,354,362
OPTION C1 TOTAL	$37,662,579	$33,896,321
OPTION C2 TOTAL	$37,008,877	$33,307,989
OPTION C3 TOTAL	$35,388,832	$31,849,948
OPTION D TOTAL	$41,068,734	$36,961,861
OPTION D1 TOTAL	$38,279,933	$34,451,939
OPTION D2 TOTAL	$39,121,376	$35,209,238
OPTION D3 TOTAL	$36,332,575	$32,699,317
OPTION E TOTAL	$39,484,534	$35,536,080
OPTION E1 TOTAL	$36,815,252	$33,133,727
OPTION E2 TOTAL	$37,641,518	$33,877,367
OPTION E3 TOTAL	$36,815,252	$33,133,727
OPTION F TOTAL	$22,545,379	$20,290,841

Prepared by: A. M. Fogarty & Associates, Inc.
FORT RIVER ELEM SCHOOL 12-181 11/30/2018 3:30 PM

Page 1

Construction Cost Only in $Mill

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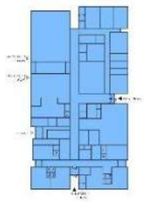
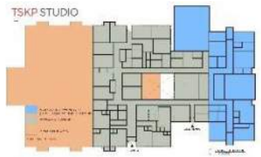


A



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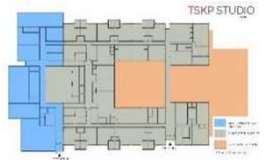

C

D

E

F

	NEW				2 STORY ADDITION				SINGLE STORY ADDITION				MULTIPLE SMALL ADDITIONS				SMALL ADDITION				CODE REPAIR	
	A	A.1	A.2	A.3	B	B.1	B.2	B.3	C	C.1	C.2	C.3	D	D.1	D.2	D.3	E	E.1	E.2	E.3	F	
ENROLLMENT	465	420	360	315	465	420	360	315	465	420	360	315	465	420	360	315	465	420	360	315	315	
% NEW	100	100	100	100	50	53	55	59	29	31	32	35	18	12	18	12	7	0	8	0	0	
PRE-K INCLUDED?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	N	
CONSTR. COST (HVAC SYS #1)	50.9	48.1	47.7	44.9	44.5	42.8	42.1	40.5	39.3	37.6	37	35.3	40.4	37.5	38.4	35.6	38.2	35.1	36.3	35.1	22.9	
CONSTR. COST (HVAC SYS #2)	52.5	49.5	49.1	46.2	46.1	44.4	43.6	41.9	40.8	39	38.3	36.6	42	39	39.9	36.9	39.7	36.5	37.7	36.5	24.4	
CONSTR. COST (HVAC SYS #3)	50.9	48.1	47.7	44.9	44.5	42.8	42.1	40.5	39.3	37.6	37	35.3	40.4	37.5	38.4	35.6	38.2	35.1	36.3	35.1	22.9	
CONSTR. COST (HVAC SYS #4)	52.8	49.9	49.5	46.5	46.5	44.7	44	42.2	41.1	39.3	38.6	36.8	42.4	39.4	40.2	37.2	40.1	36.8	38	36.8	24.7	
CONSTR. COST (HVAC SYS #5)	51.5	48.7	48.3	45.4	45.1	43.4	42.8	41.1	39.9	38.2	37.5	35.8	41	38.2	39	36.1	38.8	35.7	36.9	35.7	23.5	
CONSTR. COST (HVAC SYS #6)	50.5	47.7	47.3	44.5	44	42.4	41.8	40.1	38.9	37.3	36.6	35	39.9	37.2	38	35.2	37.8	34.7	36	34.7	22.5	

TSKP STUDIO

Total Project Cost in $Mill

*Includes 0.5% for Art

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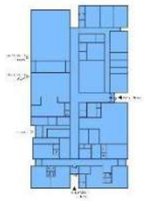
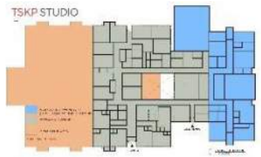


A



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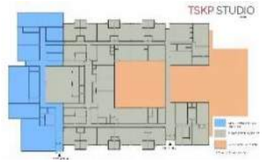

C

D

E

F

	NEW				2 STORY ADDITION				SINGLE STORY ADDITION				MULTIPLE SMALL ADDITIONS				SMALL ADDITION				CODE REPAIR	
	A	A.1	A.2	A.3	B	B.1	B.2	B.3	C	C.1	C.2	C.3	D	D.1	D.2	D.3	E	E.1	E.2	E.3	F	
ENROLLMENT	465	420	360	315	465	420	360	315	465	420	360	315	465	420	360	315	465	420	360	315	315	
% NEW	100	100	100	100	50	53	55	59	29	31	32	35	18	12	18	12	7	0	8	0	0	
PRE-K INCLUDED?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	N	
PROJECT COST (HVAC SYS #1)	63.8	60.3	59.8	56.3	55.8	53.7	52.9	50.8	49.3	47.2	46.4	44.3	50.7	47.1	48.2	4	47.9	44	45.6	44	28.8	
PROJECT COST (HVAC SYS #2)	65.9	62.2	61.7	58	57.9	55.7	54.8	52.6	51.2	49	48.1	45.9	52.7	49	50	46.3	49.9	45.8	47.4	45.8	30.6	
PROJECT COST (HVAC SYS #3)	63.8	60.3	59.8	56.3	55.8	53.7	52.9	50.8	49.3	47.2	46.4	44.3	50.7	47.1	48.2	44.6	47.9	44	45.6	44	28.8	
PROJECT COST (HVAC SYS #4)	66.3	62.6	62.1	58.4	58.3	56.1	55.2	53	51.6	49.4	48.5	46.2	53.2	49.4	50.5	46.7	50.3	46.2	47.8	46.2	31	
PROJECT COST (HVAC SYS #5)	64.7	61.1	60.6	57	56.6	54.5	53.7	51	50.1	47.9	47.1	45	51.5	47.9	48.9	45.3	48.7	44.8	46.3	44.8	29.5	
PROJECT COST (HVAC SYS #6)	63.3	59.9	59.4	55.9	55.3	53.2	52.4	50.4	48.8	46.8	45.9	43.9	50.1	46.6	47.7	44.2	47.4	43.6	45.1	43.6	28.3	

TSKP STUDIO

Fort River School| Cost Benchmarks

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DESCRIPTION	FORT RIVER ELEM. SCHOOL 11/30/18	COST/SF	WILDWOOD ELEM. SCHOOL 7/26/16	COST/SF	MAPLE ELEM. SCHOOL 7/3/18	COST/SF
	85,000 GSF		122,272 GSF		177,370 GSF	
BUILDING COST	$25,069,620	$294.94	$33,633,405	$275.07	$57,818,971	$325.98
SITEWORK	$5,640,994	$66.36	$5,385,927	$44.05	$8,527,301	$48.08
HAZARDOUS WASTE REMOVAL ALLOWANCE	$860,000	$10.12	$800,000	$6.54	$2,000,000	$11.28
BUILDING DEMOLITION	$585,000	$6.88	$492,000	$4.02	$919,128	$5.18
PV PANELS	$3,396,000	$39.95	NIC		NIC	
TOTAL DIRECT COST	35,551,614	$418.25	40,311,332	$329.69	69,265,400	$390.51
DESIGN CONTINGENCY	$4,266,194	$50.19	$4,031,133	$32.97	$6,926,540	$39.05
CM CONTINGENCY	$1,194,534	$14.05	$898,136	$7.35		
ESCALATION (fall 2017)	$3,185,425	$37.48	$1,571,739	$12.85	$3,047,678	$17.18
PRE CON	N/A		N/A			
GENERAL CONDITIONS	$4,278,454	$50.33	$4,543,187	$37.16	$4,723,774	$26.63
GENERAL REQUIREMENTS	$1,424,933	$16.76	$1,396,150	$11.42	$1,494,776	$8.43
INSURANCE	INC		INC		$1,153,685	$6.50
FEE	$1,247,529	$14.68	$1,161,000	$9.50	$2,165,296	$12.21
TOTAL CONSTRUCTION COST (inc. VE)	$51,148,682	$601.75	$53,912,677	$440.92	$88,777,149	$500.52
COST PER SF	$601.75		$440.92		$500.52	

COST LEVERAGING:			ADJUSTED COST PER SF			
	FORT RIVER ELEM. SCHOOL	COST/SF	WILDWOOD ELEM. SCHOOL	COST/SF	MAPLE ELEM. SCHOOL	COST/SF
DELETE PV	($4,177,080)	($49.14)			($339,150)	($1.91)
ADD ESCALATION TO 4 TH QTR 2020	0	0	12%	$52.91	5%	$25.03
ADD CHPTR 149 A CM	0	0	$0	0	5%	$41.89
LEVERAGED COST PER SF		**$552.61**		**$493.84**		**$565.52**
*** Note Fort River cost per sf is $27 - $34 per sf more than Wildwood and Maple Ele.**						

Fort River School| Case Study Factors

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- **Energy Use Intensity**
- **HVAC System Maintenance Costs**
- **Utility Costs**
- **Carbon Emissions**
- **Procurement Strategy**
- **Construction Duration**
- **Project Costs**

Fort River School| Cost Case Study Option A

DRAFT

Energy Use Intensity : 30
Mechanical System: #5 Chilled Beam with Air Source Heat Pump

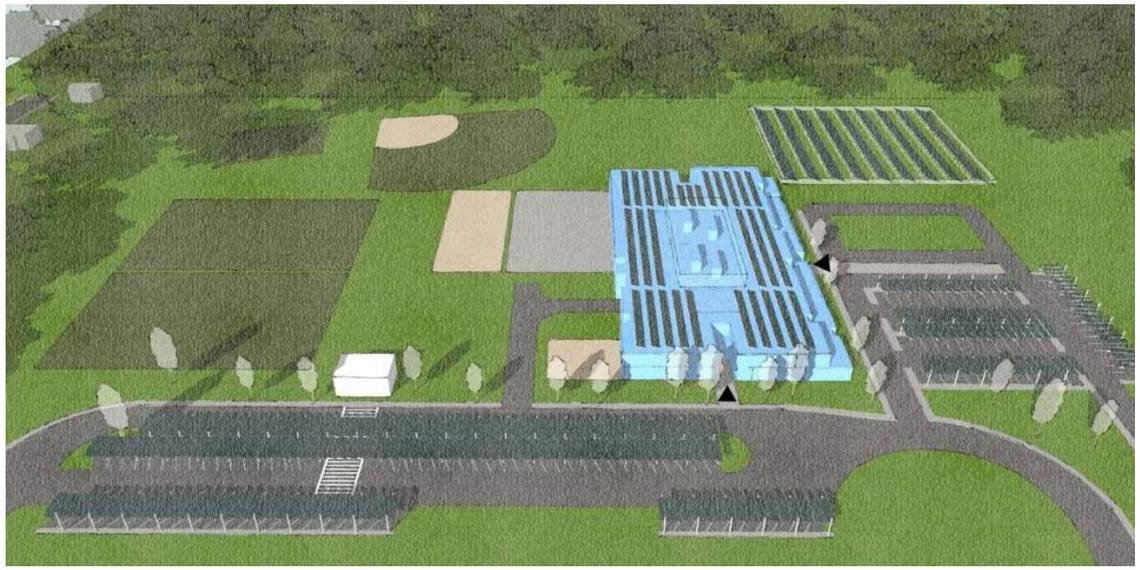
HVAC Maintenance Cost : High

Utility Cost per Year: $0 (+fixed customer charges, systems benefit and demand charges and energy efficiency reconciliation)

Carbon Emissions:

Scope I – Directly released by the building systems:	*0 kg/yr*
Scope II – Emitted in the production of electricity used:	*0 kg/yr*
Scope III – Includes Embodied energy in building materials :	*High**

*(*design strategies to reduce embodied carbon will be employed)*



Construction Duration and Phasing: 22 months

Procurement Strategy : GC

Construction Cost: PVs owned (leased)	*$46,679,296*	*549/SF*	*($44,224,950)*	*($520/SF)*
Project Cost: PVs owned (leased)	***$58,349,120***		***($55,281,187)***	

Fort River School| Cost Case Study Option C

DRAFT

Energy Use Intensity : *50*

Mechanical System: #5 Chilled Beam with Air Source Heat Pump

HVAC Maintenance Cost : High

Utility Cost per Year: ***$120,000 – 150,000/yr*** *(all-electric – 900,000 kWh)*

Carbon Emissions:

Scope I – Directly released by the building systems: *0 kg/yr*
Scope II – Emitted in the production of electricity used: *225,000 kg/yr*
Scope III – Includes Embodied energy in building materials : *Medium**
*(*design strategies to reduce embodied carbon will be employed)*

Construction Duration and Phasing: 28 months

Procurement Strategy : CM

Construction Cost: PVs owned (leased)	*$39,891,866*	*$469/SF*	*($38,443,999) ($452/SF)*
Project Cost: PVs owned (leased)	***$49,864,833***		***($48,054,998)***

Fort River School| Cost Case Study Option E

Energy Use Intensity : *50*

Mechanical System: #6 Variable Air Volume and retain existing boilers

HVAC Maintenance Cost : High

Utility Cost per Year: ***$53,773/yr*** *(25,000 therms – 400,000 kWh)*

Carbon Emissions:

Scope I – Directly released by the building systems:	*132,500 kg/yr*
Scope II – Emitted in the production of electricity used:	*100,000 kg/yr*
Scope III – Includes Embodied energy in building materials :	*Low**

*(*design strategies to reduce embodied carbon will be employed)*

Construction Duration and Phasing: 36 months and requires temp. construction.

Procurement Strategy : CM

Construction Cost:	*$37,803,173*	*$445/SF*
Project Cost:	***$47,253,966***	

Fort River School| Case Study Factors

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- **Energy Use Intensity :** **30 - 50**
- **HVAC System Maintenance Costs :** **Low - High**
- **Utility Costs :** **$0 - $150,000/yr**
- **Carbon Emissions**
  - **Scope I :** **0 – 132,500 kg/yr**
  - **Scope II :** **0 – 225,000 kg/yr**
  - **Scope III :** **Low - High**
- **Procurement Strategy :** **GC or CM**
- **Construction Duration :** **22 – 36 months**
- **Project Costs :** **$48 - $58 Million**